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(12) **UK Patent Application** (19) **GB** (11) **2 250 565 A** (13)
(43) Date of A publication 10.06.1992

(21) Application No 9026713.9

(22) Date of filing 07.12.1990

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(51) INT CL⁵
F16L 55/165

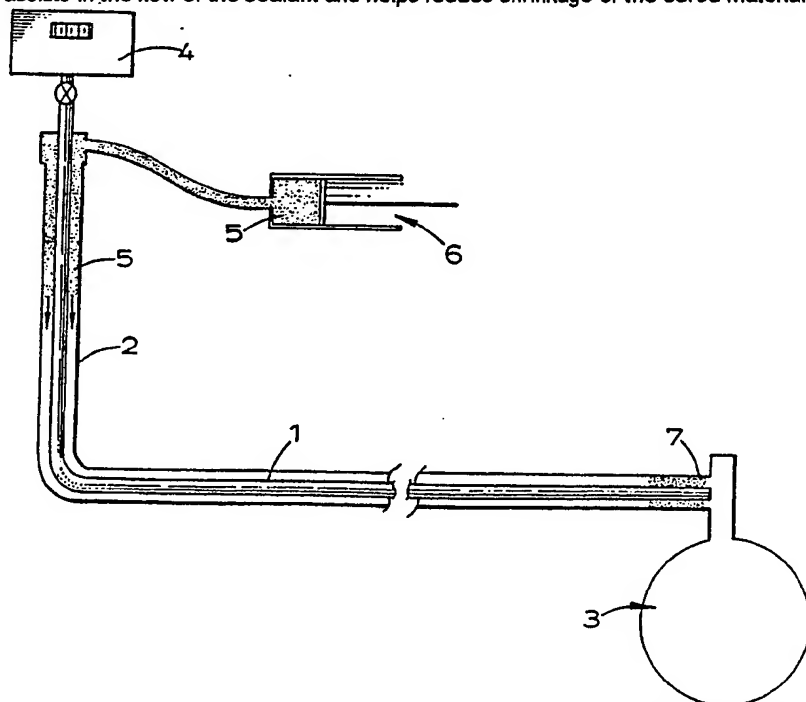
(52) UK CL (Edition K)
F2P PTBL

(56) Documents cited
GB 2239301 A **GB 2236158 A** **GB 2227071 A**
GB 2123919 A **GB 2082285 A**

(58) Field of search
UK CL (Edition K) F2P PTBL
INT CL⁵ F16L 55/165

(54) Sealing within pipes

(57) In order to seal the annular space between an existing gas service pipe (2) and a plastics liner (1) a sealant (5) in the form of a paste or gel is pumped into the annular space from the meter end of the service. The sealant is formulated such that the advancing front of the sealant mass is a wall extending transversely of the pipes (1, 2). Various compositions of sealant are described. The parts by weight of a preferred sealant are:- ordinary Portland Cement 100, pulverised fuel ash 0-150, styrene butadiene latex 10-50, water 0-60, plasticiser 0-20. The latex assists in adhering the sealant to the pipes, and the plasticiser assists in the flow of the sealant and helps reduce shrinkage of the cured material.

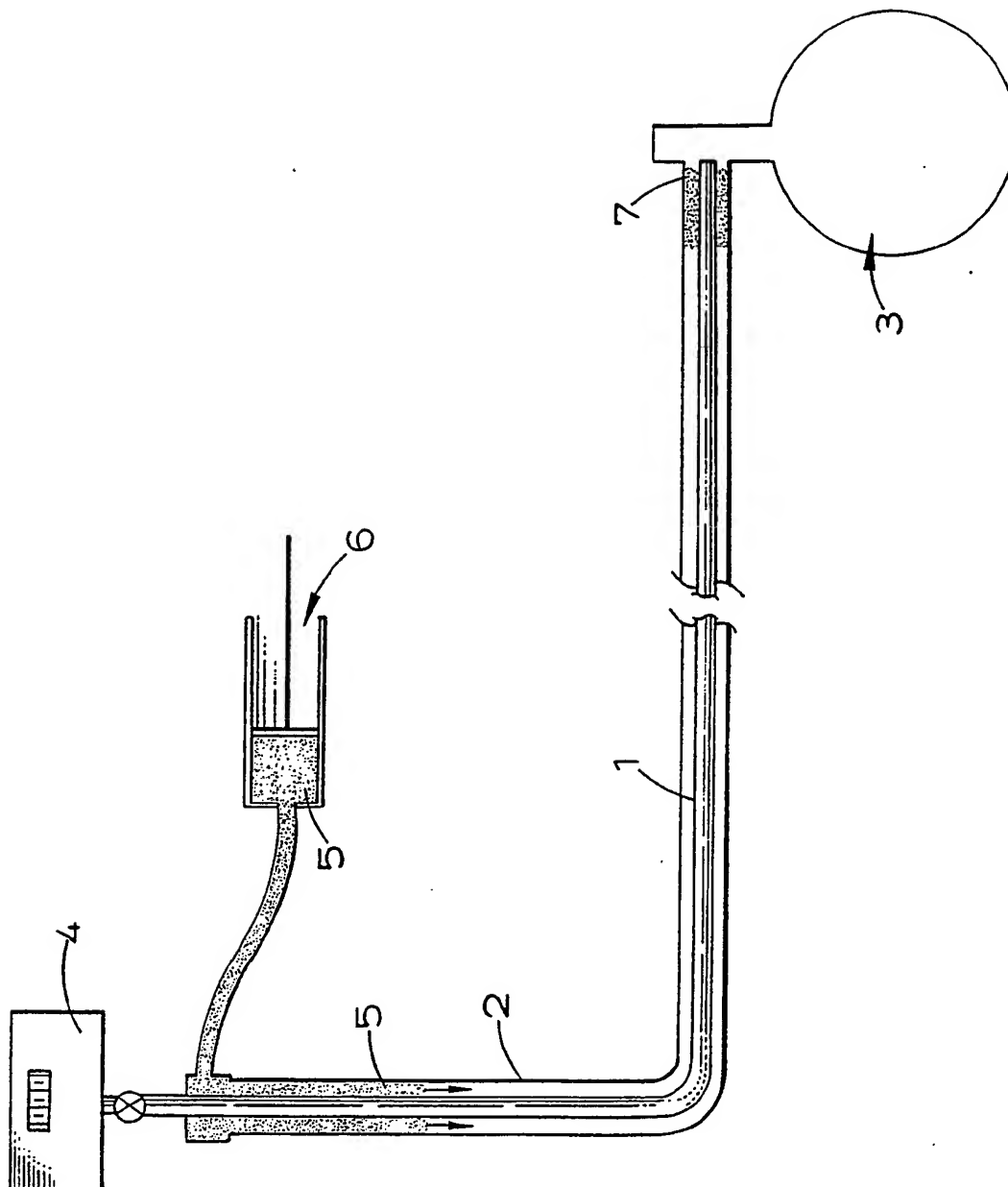


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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SEALING WITHIN PIPES

5 The present invention relates to sealants for sealing an enclosure and particularly to a sealant for use in sealing the annular gap between a pipe and a pipe liner.

10 The pipe may be employed for carrying liquids or gases. The invention relates particularly, but not exclusively, to lining pipes which are employed for the distribution of natural or manufactured hydrocarbon gases to the users of such.

15 According to one aspect of the present invention, a method of lining a pipe with a liner comprises introducing a sealant into the annular gap between the pipe and the liner, the sealant being in the form of a paste or gel.

20 According to a second aspect of the invention, a method of lining a pipe with a liner comprises introducing a sealant into the annular gap between the pipe and the liner, the sealant being formulated such that the sealant can be pumped along the annular gap and such that the advancing end of the sealant mass takes the form of a wall extending substantially transversely of the pipe.

25 The sealant material is preferably a cement-based composition.

It is preferable that the composition be formulated to exhibit minimal shrinkage on curing and more preferably to expand on curing.

30 Preferably, the composition is formulated such that the sealant adheres to the surfaces it contacts in the sealing situation. It is also preferable that the sealant is formulated so that when cured it is completely impermeable to gases or fluids. Also it is preferable that the cured sealant has toughness and resilience in order to
35 resist expansion and contraction caused by thermal changes.

5 The invention will now be further described, by way of example only,
with reference to the accompanying drawing, which is a schematic
vertical cross-section of an underground gas service comprising a
new polyethylene pipe 1 that has been inserted into an existing
steel service pipe 2. The polyethylene pipe 1 is intended to
transport gas from the gas main 3 to the customer's meter 4. In
order to seal the annular space between pipes 1 and 2, sealant 5 is
introduced into the annular space by the pump 6, the final position
of the sealant being shown at 7.

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The reason for lining a gas service pipe is to replace the gas
carrying function of the steel pipe 2 (which may actually be
weakened or leaking through corrosion) by the polyethylene pipe.

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The sealant described herein is designed to be injected into the
annular space between the steel and the polyethylene pipe to extend
along substantially the entire length of the service.

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It is the function of the inventive sealing compound to cause gas
from the main to be carried to the meter through the polyethylene
pipe and not along the annular gap between the polyethylene pipe 1
and the steel pipe 2. As a consequence of the presence of the
inventive sealant, the service function is transferred from the
steel pipe to the polyethylene one. The sealant is pumped from the
meter end of the service pipe along the annular gap to the main end.

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30 The 'flow' of the sealant, by nature of its gel-like form, along the
annular space between the two pipes, should be as a 'plug flow', in
which the front of the sealant moves as a single wall, pushing the
gas in the annular space before it, the wall extending substantially
transversely of the pipes.

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35 The sealant described here is not limited to sealing gas services.
Flow stopping and sealing in a variety of situations can also be
undertaken.

A particularly preferred composition of sealant in accordance with the invention is based on cement, particularly ordinary Portland Cement. However, other types of cement such as High Alumina Cement can also be used.

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An alternative base for the composition is gypsum.

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The composition also preferably comprises a latex, or an emulsion of a polymeric compound. This is to impart adhesive properties to the cured compound and also to give it toughness and flexibility. The preferred types of latices can be typically styrene-butadiene, poly vinyl acetate, vinyl acetate-ethylene, vinyl acetate-ethylene-vinyl chloride, vinyl acrylic and Neoprene (trade name of the Du Pont Company).

15

The composition also preferably contains a plasticiser to assist in the easy flow of the sealing compound and to reduce shrinkage of the cured compound. These may typically be, but are not restricted to, lignosulphonates, hydroxylated carboxylic acids and sulphonated melamine formaldehyde.

20

The composition may also contain extenders preferably, but not restricted to, pulverised fuel ash (PFA). The composition may also contain water to assist in the hydraulic cure of the cement: however this may not be required.

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The preferred composition is formulated to give, on mixing the components together, a smooth paste or gel. This mixed material can then readily be pumped or pasted into the desired location. Pumping can be carried out using hand or machine powered equipment such as positive displacement or screw-type pumps.

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By way of example only, a suitable formulation may have the following composition:

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	<u>Parts by Weight</u>
Ordinary Portland Cement	100
Pulverised Fuel Ash	0 - 150
Styrene Butadiene latex	10 - 50
5 H ₂ O	0 - 60
Plasticiser	0 - 20

10 The composition might also contain cure accelerators or retarders. It might also contain additional gelling agents such as, but not restricted to, hydroxy ethyl cellulose or bentonite clay.

A typical cured composition cures to a tough compound adhering to steel and other types of pipes.

15 A third aspect of the invention comprises novel sealant compositions hereinbefore described.

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CLAIMS

1. A method of lining a pipe with a liner comprising introducing a sealant into the annular gap between the pipe and the liner, the sealant being in the form of a paste or gel.
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2. The method of Claim 1 in which the sealant is formulated such that the sealant can be pumped along the annular gap and such that the advancing end of the sealant mass takes the form of a wall extending substantially
10 transversely of the pipe.
3. The method of Claim 1 or Claim 2 in which the sealant contains gypsum.
- 15 4. The method of Claim 1 or Claim 2 in which the sealant contains cement.
5. The method of Claim 4 in which the cement is Portland Cement.
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6. The method according to any one of the preceding claims in which the sealant is so formulated that the sealant adheres to the pipe and liner.
- 25 7. The method of Claim 6 in which the sealant comprises a latex.
8. The method according to any one of the preceding claims in which the sealant comprises a plasticiser.
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9. The method according to Claim 8 in which the plasticiser is from the group consisting of lignosulphonates, hydroxylated carboxylic acids and sulphonated melamine formaldehyde.
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10. The method according to Claim 1 in which the sealant has the following composition expressed as parts by weight :-

	Ordinary Portland Cement	100
5	Pulverised fuel ash	0 - 150
	Styrene butadiene latex	10 - 50
	Water	0 - 60
	Plasticiser	0 - 20

10 11. The method of Claim 1 and substantially as herein described with reference to the accompanying drawing.

15 12. A method of lining a pipe with a liner comprising introducing a sealant into the annular gap between the pipe and the liner, the sealant being formulated such that the sealant can be pumped along the annular gap and such that the advancing end of the sealant mass takes the form of a wall extending substantially transversely of the
20 pipe.

13. A sealant having the composition, expressed as parts by weight :-

	Ordinary Portland Cement	100
25	Pulverised fuel ash	0 - 150
	Styrene butadiene latex	10 - 50
	Water	0 - 60
	Plasticiser	0 - 20

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number
 9026713.9

Relevant Technical fields

- (i) UK Cl (Edition K) F2P (PTBL)
- (ii) Int Cl (Edition 5) F16L 55/165

Search Examiner

B J PROCTOR

Databases (see over)

(i) UK Patent Office

Date of Search

06.01.92

Documents considered relevant following a search in respect of claims 1 AT LEAST

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X,E	GB 2239301 A (STEPHENS) - eg pages 11,25	1,4,5,6, 8 at least
X,E	GB 2236158 A (HICKS) - eg figures 7,8	1 at least
X	GB 2227071 A (BRITISH GAS) - eg figure 30	1 at least
X	GB 2123919 A (STEVE VICK) - eg figure 1B, page 3 lines 1-5	1-3 at least
X	GB 2082285 A (INSITU FORM) - eg figure 1, page 2 line 11	1,4 at least

SF2(p)

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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).